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SUB-COMMITTEE ON SAFETY OF  
NAVIGATION  
45th session  
Agenda item 7.1

NAV 45/INF.6  
23 July 1999  
ENGLISH ONLY

## NAVIGATIONAL AIDS AND RELATED MATTERS

### World-wide radionavigation system

#### Submission by the International Civil Aviation Organization (ICAO)

#### SUMMARY

**Executive summary:** This paper provides information concerning the outcome of the third meeting of the Global Navigation Satellite System Panel (GNSSP/3) held in Montreal, 12-23 April 1999.

**Action to be taken:** Note the information provided

**Related documents:** Resolution A.860(20)

## 1 Introduction

1.1 The third meeting of the Global Navigation Satellite System Panel (GNSSP/3) was held in Montreal from 12 to 23 April 1999. Twenty-two panel members or their temporary replacements attended the meeting, accompanied by sixty advisers. Eight observers also attended the meeting, including the observer from the International Maritime Organization (IMO).

## 2 Summary of the work of the meeting

### 2.1 Agenda item 1: Development of Standards and Recommended Practices (SARPs) and guidance material on GNSS for Annex 10

2.1.1 The meeting reviewed draft SARPs for GNSS, including SARPs for global positioning system (GPS), GLObal NAVigation satellite system (GLONASS), aircraft-based augmentation system (ABAS), satellite-based augmentation system (SBAS) and ground-based augmentation system (GBAS), and recommended to incorporate these SARPs into Annex 10 to the Convention on International Civil Aviation. It also recommended an amendment to the Annex to introduce GNSS as a standard aid to navigation, approach and landing and developed initial guidance material on application of GNSS SARPs. The envisaged applicability date for GNSS SARPs in Annex 10 is 4 November 1999.

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2.1.2 The meeting also addressed GNSS spectrum issues and developed proposals for the relevant ICAO position in the International Telecommunication Union (ITU) on these issues. The meeting made two recommendations on GNSS spectrum matters, drawing attention of States to the need to cease fixed service operations and improve radio frequency (RF) coordination and control when GNSS operations are introduced.

2.1.3 As requested by the ICAO Council, the GNSSP/3 meeting also addressed a proposal by the United States for an additional GPS frequency for aeronautical applications (GPS L5 at 1 176.45 MHz). The panel agreed to a work plan that includes development of draft SARPs for the GPS L5 signal and assessment of the impact of the L5 allocation on aeronautical radio navigation services, particularly distance measuring equipment (DME), in the 960 - 1 215 MHz band. The results of this assessment will form the basis for the final ICAO position on the allocation of the GPS L5 frequency at WRC-2000.

## **2.2 Agenda Item 2: Development of proposals for amendments to ICAO documents affected by GNSS SARPs**

2.2.1 The meeting reviewed proposals for amendment to a number of ICAO documents and recommended an amendment to Annex 10 to incorporate Recommended Practices for the ground recording of GNSS data for the purposes of accident/incident investigations and continuous monitoring of signal-in-space performance. The recommendation is primarily for the recording of augmentation data, while the need for the recording of navigation satellite constellation data can be fulfilled either by the implementation of this data monitoring in the States concerned or by using information available from a service provider State.

## **2.3 Agenda Item 3: Development of guidelines for the long-term GNSS**

2.3.1 The meeting developed guidelines for the long-term GNSS that discuss all basic aspects of GNSS evolution. The guidelines represent a complete overview of present and forthcoming developments that will govern the evolution of GNSS in the foreseeable future. It should be noted that the terminology suggested by the panel no longer refers to various configurations (e.g GNSS1, GNSS2) of the system. Rather, the panel promoted the concept of GNSS with new elements added, subject to their standardization within the framework of GNSS SARPs.

2.3.2 The guidelines set forth general directions to be followed by ICAO in the work towards future GNSS. Some of these directions are already reflected in GNSSP/3 recommendations. Other issues, such as availability of RF spectrum for GNSS evolution, are being addressed by ICAO or are proposed for the future work programme of the panel.

2.3.3 In particular, the guidelines identify the need to address the following aspects of a GNSS:

- (a) the continued provision (permanency) of the service to the users;
- (b) the operation of the GNSS in respect of its ability to meet various user requirements;
- (c) the application of internationally established cost-sharing and cost-recovery principles; and
- (d) the application of internationally established principles on liability issues.

2.3.4 It is intended that the GNSSP in its future work on GNSS will:

- (a) consider how security issues can be accommodated in SARPs or otherwise;

- (b) apply the concept of backward compatibility; and
- (c) continue to monitor the developments of GNSS services in order to accommodate these developments in SARPs.

2.3.5 It is also expected that ICAO:

- (a) apply the “sliding window” protection method (six-year advance notice) for future amendments of GNSS SARPs in Annex 10;
- (b) continue to take actions to ensure that the radio spectrum resources necessary for GNSS evolution are made available through ITU and kept free from interference; and
- (c) co-operate with IMO and other international organizations representing other modes of transport in the development of a future GNSS.

2.3.6 The GNSSP/3 meeting noted that IMO had developed and adopted a “Maritime Policy for a Future Global Navigation Satellite System (GNSS)” (IMO Assembly resolution A.860(20) refers) which encourages the involvement of IMO in discussions on GNSS with air and land users and promotes close contacts between IMO and ICAO. The GNSS Panel also stressed the importance of ICAO co-ordination on GNSS with organizations representing other modes of transport, particularly with the International Maritime Organization (IMO), and made a recommendation to this effect. The ICAO Air Navigation Commission noted the recommendation with the understanding that the Secretary General of ICAO would continue to co-ordinate GNSS issues of common interest.

#### **2.4 Agenda Item 4: Consideration of issues resulting from the initial introduction of GNSS**

2.4.1 The panel reviewed information on the status of GNSS operational approvals and included a summary of this information in the report of the meeting.

2.4.2 The meeting also examined the issue of GNSS as a sole means of navigation and developed draft material for inclusion in the ICAO Global Air Navigation Plan for CNS/ATM Systems that provides clarifications to relevant terminology and additional guidance on transition to GNSS-based navigation.

#### **2.5 Agenda Item 5: Future work**

2.5.1 The panel reviewed its work programme taking into account the outcome of GNSSP/3 and made a recommendation for revision of the programme. Two working groups were established to continue work on operational and technical issues with the priority attached to the work items to be completed by the next panel meeting (GNSSP/4).

2.5.2 The revised work programme, contains items for completion at GNSSP/4 and GNSSP/5 with the target dates of 2002 and 2004, respectively. In the technical area, the panel’s work towards GNSSP/4 will focus on the development of SARPs for ground-based regional augmentation system (GRAS), SBAS interface, GPS L5 signal and, subject to the progress in system development, GLONASS-M. Standardization of GNSS elements capable of supporting Category II/III operations, aerodrome surface operations, take-off and curved approaches is envisaged by 2004. The latter target date was also established for standardization of Galileo subject to the progress in system development. In the operational area, material for ICAO documents containing provisions for Air Traffic Services, aeronautical information including NOTAMs and other operational aspects will be progressed.

2.5.3 The work programme now includes new elements that are beyond the previously defined scope of the GNSS work and require the panel's involvement in the area of ground-based navigation aids.

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